International Heliophysical Year

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IHY Science Highlight:
Tracking an iCME through the Heliosphere

S. J. Tappin (School of Physics and Astronomy, University of Birmingham, UK)

By using observations from the Solar Mass Ejection Imager (SMEI), LASCO and EIT on SOHO, and the SWOOPS (plasma) and MAG (field) instruments on Ulysses, it has been possible to track the progress of an interplanetary coronal mass ejection (iCME) all the way from the Sun to near 5 AU.

A SMEI transient seen in the eastern sky on 7 April 2003 could be confidently identified with an east-limb CME in LASCO on 5 April. At this time Ulysses was also to the east of the Sun and a low northerly latitude and a distance of about 4.8 AU. The plasma and field sensors observed two interplanetary shocks on 18 and 21 April. From the LASCO data it was possible to estimate the mass of the CME and its extent in latitude, while the SMEI and EIT observations combine to provide a lower limit on the extent in longitude. Because SMEI provides the location of the iCME over an extended region in the region near 1 AU it is possible to produce a more detailed height-time profile than has hitherto been possible.

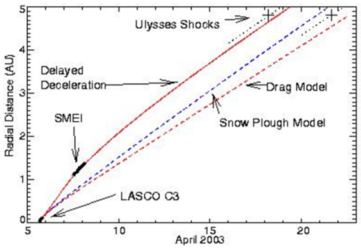

Figure: Modeled height-time profiles for a transient disturbance with the properties of the 5 April 2005 CME compared with the observations of that transient by LASCO, SMEI and Ulysses. The models are: the Cargill drag model, a simple snow-plough model and a modification of the drag model with no deceleration below 0.8 AU.

The physical parameters can be combined with dynamical models of CME deceleration, in particular, that of Cargill (2004) to calculate an expected height-time evolution that can be compared with the observations. It is found that the models predict much more deceleration than is observed between the Sun and 1 AU, and force us to the conclusion that the CME must be experiencing an accelerating force in that region. It is also seen that without the SMEI data, the LASCO CME would be very likely to be identified with the wrong Ulysses shock.

These results are presented in detail in a paper to be published in Solar Physics.

SMEI is a collaboration of the US Air Force Research Laboratory, the University of Birmingham and the University of California at San Diego. SOHO and Ulysses are both projects of international cooperation between ESA and NASA.

References:

Cargill, P.J.: (2004) Solar Physics, 221, 135
Tappin, S.J.: Solar Physics (in press)

CIP (Coordinated Investigation Program)

The IHY-UK team has launched the new CIP registration form. If you have an idea or suggestion for scientific research or activities to be performed during IHY, please go to the site and enter the information as a CIP.

The CIPs will form the basis for the IHY scientific plan. We will be accepting CIPs into 2006. URL:

http://www.ihy.rl.ac.uk/CIP_form.htm

UN Proclamation

Barbara Thompson (NASA/GSFC)

During the deliberations of the 42nd Session of the Scientific and Technical Subcommittee of the UN Committee on the Peaceful Uses of Outer Space (02/21/05 - 03/04/05), the United States had introduced a resolution for the UN to Support to Proclaim the Year 2007 as the International Geophysical and Heliophysical Year.

IHY European General Assembly: The first IHY European General Assembly will be held at the Centre National de la Recherche Scientifique (CNRS) in Paris: 10 - 13 January 2006. Topics include: Status of European IHY science and educational activities and the presentation and development of an operational framework for Coordinated Investigation Program: http://calys.obspm.fr/IHY/IHY_colloque/

IGY Gold! Nuggets from the past.

Roger Smith (University of Fairbanks, AK)

IGY was a turning point for Fairbanks Alaska and the Geophysical Institute. Sydney Chapman brought this about through his vision and organizing genius in the creation of a global upper atmospheric research dimension. At the time of the mid fifties, auroral research was in a major explorative phase supported by the all-sky camera and meridional spectrograph network in the polar regions both north and south.

In a more general sense, Chapman's contribution to IGY can hardly be better stated than in the words of Lloyd Berkner (edited for this contribution). "That Sydney Chapman was President of the Special Committee for the IGY (CSAGI) in itself suggests a good deal about his contribution to that unprecedented enterprise. It implies, for example, that he must have been involved in its planning and shaping, in its conduct over the eighteen and then thirty months of its duration, and in its completion. What is perhaps not implied, however, is the depth and extent of his role. Intertwined with his particular nature as a creative scientist, and not to be distinguished from it, is his own being as a man. Here, what is relevant to this characterization is the moral fabric, the moral tone of the man. None who encountered him in the planning of the IGY could miss this tone, and none failed to leave him without a general feeling of trust. Such trust, in turn, reinforced one's scientific confidence in the endeavor, and both worked to enhance the IGY. Others may view matters in another light. I doubt that he himself was aware of these elements, for I am convinced that they operated unconsciously; they were just an integral part of the man. But it was this tone, this moral fabric, coupled to a sense of history, that marked his fundamental and essential contribution to the IGY, and to its progeny---COSPAR, IQSY, WMS, SCAR, and other enterprises---in which his hand still appears, steadfast and helpful."

The complete Berkner article on Chapman and some history of his role in IGY can be found at: http://www.gi.alaska.edu/chapman/igy.html.

Black Sea and Caspian Sea Regional Network on Space Weather Studies

Barbara Thompson (NASA/GSFC)

A regional network of representatives from Armenia, Azerbaijan, Bulgaria, Croatia, Georgia, Greece, Poland, Romania, Russia, Serbia and Montenegro, and Ukraine participated in the IHY Balkan and Black Sea Regional Planning Meeting at Sozopol, Bulgaria, 6 - 8 June 2005.

While scientists from Czech Republic, Slovakia and Turkey were unable to attend that meeting, they expressed an intent to be included in the planned activities. Representatives from France as well as the EOARD office participated in that meeting.

The major outcomes of that meeting were (a) the establishment of a Black Sea and Caspian Sea Regional Network on Space Weather Studies and (b) establishment of an International refereed scientific journal The Sun and Geosphere with an international editorial board.

More details of the group can soon be found at: http://www.stil.bas.bg/IHY

Upcoming Events:

AGU: 5 - 9 December

AGU Special session SH09
Sun-Solar System Connection Great Observatory [Link]

AGU Special session SM13
Magnetic reconnection as a universal process: The laboratory, the magnetosphere, and the Sun [Link]

AGU Special session SM09
Ground Distributed Instrument Arrays: Success Stories and New Concepts [Link]

AGU Special session SA05
International Heliophysical Year: Looking Through the Ionospheric Window to the Heliosphere [Link]

AGU Special session ED08
Global Geoscience Education and Outreach III: International Geophysical Year 2 and the International Years [Link]

AGU Special session ED17
Deciphering Data: Communicating Research Activities and Findings to Diverse Audiences [Link]

AGU Special session ED22
Earth and Planetary Sciences E/PO in Developing Countries: Local and International Initiatives [Link]

AGU Special session SH06
Contributions of High-Resolution Spectroscopy to Understanding the Solar Atmosphere [Link]

November 20-23, 2005
IHY United Nations/ESA Workshop on Basic Space Science. Al-Ain, UNITED ARAB EMIRATES
Contacts: Nat GOPALSWAMY and Hans HAUBOLD

IHY Science Coordination Database: http://ihy.gsfc.nasa.gov/scientists.shtml

IHY/UNBSS Small Instrument Array Deployment Opportunity

Nat Gopalswamy (NASA/GSFC)

1. Small Instrument Arrays

A major thrust of the International Heliophysical Year (IHY) is to deploy arrays of small, inexpensive instruments such as magnetometers, radio antennas, GPS receivers, all-sky cameras, etc. around the world to provide global measurements of ionospheric and heliospheric phenomena. This program is a collaboration between the IHY and the United Nations Basic Space Science (UNBSS) program, which has been dedicated to the IHY through 2009. The small instrument program is envisioned as a partnership between instrument providers, and instrument host countries. The lead scientist will provide the instruments (or fabrication plans for instruments) in the array; the host country will provide manpower, facilities, and operational support to obtain data with the instrument typically at a local university. Funds are not available through the IHY to build the instruments; these must be obtained through the normal proposal channels. However all instrument operational support for local scientists, facilities, data acquisition, etc will be provided by the host nation. It is our hope that the IHY can facilitate the deployment of 3-5 of these networks worldwide. To begin the discussion between potential instrument providers and host countries, a workshop has been arranged for November 20-23, 2005 in United Arab Emirates (UAE). Additional information on the workshop is available at:

http://www.fsc.uaeu.ac.ae/physics/UNESA.htm.

Approximately 25 participants from developed countries will be selected by August 15, 2005 to attend the workshop.

2. CALLISTO: Radio Spectrograph

The Swiss radio spectrograph CALLISTO will be installed at the Radio Astronomy Center in Ooty, India under the IHY/UNBSS program. Dr. P. K. Manoharan from India will host the instrument. CALLISTO was developed by the Swiss team headed by Dr. Arnold Benz. CALLISTO's are already in operation inSwitzerland and Greenbank (USA). The third one in India along with the existing HiRAS radio spectrograph in Hiraiso (Japan) will provide 24 h coverage of the Sun in observing geoeffective solar disturbances in the form of type II radio bursts.

3. Host Countries

We are seeking host countries/universities/scientists to partner with IHY/UNBSS deployment of several (about half a dozen) GPS/SCINDA instruments along geomagnetic equator in Africa. These instruments will provide information on the total electron content and irregularities in the ionosphere so that routine global picture of the ionosphere can be constructed on a routine basis. Interested parties should contact Nat Gopalswamy [gopals@fugee.gsfc.nasa.gov] before September 1.

4. 2nd IHY/UNBSS Workshop

The Inter University Center for Astronomy and Astrophysics (IUCAA) in Pune India has offered to host the second IHY/UNBSS workshop in 2006. IUCAA has excellent conference and lodging facilities located in academic atmosphere with the National Center for Radio Astrophysics of the Tata Institute of Fundamental Research and the Pune University. Plans are being made to augment the UNBSS workshop with scientific sessions so that the participants can benefit from the scientific discussions. Stay tuned for details.

IHY/UNBSS Action

N. Gopalswamy (NASA/GSFC)

Funds have been secured by US scientists to install GPS/SCINDA instruments at several locations around the magnetic equator of Earth. Two institutions in India have agreed to host the Instruments. We are seeking more hosts in Africa.

ICRC 2007 to host a dedicated IHY session

Marius S. Potgieter (African Regional Coordinator for IHY)

The cosmic ray commission (IUPAP C4) has recommended recently during the 29th International Cosmic Ray Conference (ICRC) in Pune, India that a dedicated IHY session should be organized during the next ICRC in Mexico in 2007. The chairperson for the ICRC in Mexico is Dr. Jose Valdes Galicia, who is involved in the Mexican IHY team, so it will be an exciting meeting for IHY.

Newsletter Submissions:

We are always looking for contributions to the IHY newsletter! Do you have an article, announcement, meeting summary, an interesting IHY highlight or effort? Submit it to:

bala@nso.edu